

# Equations

Honors and CP Physics

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## Kinematics:

$$\bar{v} = \frac{\Delta \bar{x}}{\Delta t} \quad (1)$$

$$\bar{a} = \frac{\Delta \bar{v}}{\Delta t} \quad (2)$$

$$\Delta x = v_{ix}t + \frac{1}{2}a_xt^2 \quad (3)$$

$$v_{fx}^2 = v_{ix}^2 + 2a_x\Delta x \quad (4)$$

$$v_{fx} = v_{ix} + a_xt \quad (5)$$

$$\Delta y = v_{iy}t + \frac{1}{2}a_gt^2 \quad (6)$$

$$v_{fy}^2 = v_{iy}^2 + 2a_g\Delta y \quad (7)$$

$$v_{fy} = v_{iy} + a_gt \quad (8)$$

## Momentum:

$$\bar{p} = m\bar{v} \quad (9)$$

$$\bar{J} = \Delta \bar{p} \quad (10)$$

$$\bar{F}\Delta t = m\Delta \bar{v} \quad (11)$$

$$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f} \quad (12)$$

$$(m_1 + m_2)\bar{v}_i = m_1v_{1f} + m_2v_{2f} \quad (13)$$

$$m_1v_{1i} + m_2v_{2i} = (m_1 + m_2)\bar{v}_f \quad (14)$$

**Forces:**

$$\Sigma \vec{F} = m\vec{a} \quad (15)$$

$$F_f = \mu F_N \quad (16)$$

$$F_g = ma_g \quad (17)$$

**Work, Energy, and Power:**

$$W = F d \cos\theta \quad (18)$$

$$W = \Delta E = (K_f - K_i) + (U_{gf} - U_{gi}) \quad (19)$$

$$E_i = E_f \quad (20)$$

$$K_i + U_{gi} = K_f + U_{gf} \quad (21)$$

$$K = \frac{1}{2}mv^2 \quad (22)$$

$$U_g = ma_g h \quad (23)$$

$$P = \frac{W}{t} = Fv \quad (24)$$

**Waves, Sound, and Light:**

$$T = \frac{1}{f} \quad (25)$$

$$v = \lambda f = \frac{\lambda}{T} \quad (26)$$

$$I = \frac{P}{4\pi r^2} \quad (27)$$

$$f_n = \frac{nv}{2L}, n = 1, 2, 3, \dots \quad (28)$$

$$f_n = \frac{nv}{4L}, n = 1, 3, 5, \dots \quad (29)$$

$$c = \lambda f = \frac{\lambda}{T} \quad (30)$$

$$E = hf \quad (31)$$

$$n = \frac{c}{v} \quad (32)$$

$$n_1 \sin\theta_1 = n_2 \sin\theta_2 \quad (33)$$

**Electrostatics:**

$$\bar{F} = \frac{k|q_1||q_2|}{r_{12}^2} \quad (34)$$

$$\bar{E} = \frac{k|q|}{r^2} \quad (35)$$

$$\bar{E} = \frac{\bar{F}}{q} \quad (36)$$

$$\Delta U_e = -qEd \quad (37)$$

$$\Delta V = -Ed \quad (38)$$

**Circuits:**

$$V = IR \quad (39)$$

$$R_{eq} = R_1 + R_2 + \dots \quad (40)$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots \quad (41)$$

$$P = IV = I^2R = \frac{V^2}{R} \quad (42)$$

$$Energy = Pt \quad (43)$$